

Serial No. 10/040,173

RECEIVED
CENTRAL FAX CENTER

JUL 18 2006

Amendments to the Claims:

The following claims replace all prior versions, and listings, of claims in the application.

1. (previously presented) A system for improving performance of wireless communications comprising:

a transmitter that is configured to produce a modulated data signal that includes an addition of one or more supplemental signals on a plurality of frequencies to an input data signal within a monocarrier channel employed to transmit the modulated data signal; and

a receiver that is configured to use the one or more supplemental signals to compute a frequency domain channel estimate for use in equalizing the channel during demodulation of the data signal.

2. (previously presented) The system of claim 1, wherein:

the one or more supplemental signals each employ a different frequency that changes during each of a plurality of periods, and

the time-varying frequency for each supplemental signal changes from one period to a subsequent period in a predetermined sequence of frequencies within the channel.

3. (previously presented) The system of claim 2, wherein

the predetermined sequence spans frequencies within the channel to directly provide a frequency domain channel estimate.

4. (previously presented) The system of claim 2, wherein

the predetermined sequence is coordinated with a field sync within the modulated data signal.

5. (previously presented) The system of claim 2, wherein

the one or more supplemental signals are each transmitted with a power selected to avoid interference with demodulation of the data signal without reference to the one or more supplemental signals.

6. (previously presented) The system of claim 2, wherein

the time varying frequency cycles through a plurality of frequencies within the predetermined sequence at a rate sufficient to permit multiple channel estimates for a single field of the modulated data signal.

7. (previously presented) The system of claim 2, wherein:

the predetermined sequence is coordinated with a field sync within the modulated data signal, and

the one or more supplemental signals are each transmitted with a power selected to avoid interference with demodulation of the data signal without reference to the one or more supplemental signals.

8. (currently amended) A transmitter for improved wireless communications comprising:

a symbol source producing a data signal;

a waveform generator producing a time-varying signal that changes frequency during each of a plurality of periods, wherein

the frequency changes from one period to a subsequent period in a predetermined sequence of frequencies within a channel to be employed in transmitting the data, the time-varying signal being transmitted with a power selected to avoid interference with demodulation of the data signal without reference to the time-varying signal; and

a modulator producing a transmission signal from a sum of the data signal and the time-varying signal.

9. (previously presented) The transmitter of claim 8, wherein

the predetermined sequence spans the channel to directly provide a frequency domain channel estimate.

10. (canceled)

11. (canceled)

12. (previously presented) The transmitter of claim 8, wherein

the time varying signal cycles through each of the frequencies within the predetermined sequence at a rate sufficient to permit multiple channel estimates for a single field of the data signal.

13. (currently amended) The transmitter of claim 8, wherein:

the predetermined sequence is coordinated with a field sync within the data signal, ~~and the time-varying signal is transmitted with a power selected to avoid interference with demodulation of the data signal without reference to the time-varying signal.~~

14. (previously presented) The transmitter of claim 8, wherein

the time-varying signal is one of a plurality of time-varying signals each having a different frequency during a period and each changing frequency from one period to a subsequent period in the predetermined sequence of frequencies.

15. (Original) A receiver for improved wireless communications comprising:

an equalizer performing channel equalization on a received signal utilizing a channel estimate; and

a coherent demodulator producing the channel estimate from the received signal and a time-varying signal corresponding to a portion of the received signal, wherein

the time-varying signal changes frequency during each of a plurality of periods, wherein

the frequency changes from one period to a subsequent period in a predetermined sequence of frequencies within a channel on which the received signal is received.

16. (previously presented) The receiver of claim 15, including

a waveform generator producing the time varying-signal,

wherein

Serial No. 10/040,173

a period duration and the predetermined sequence match a corresponding period duration and predetermined sequence employed in generating the received signal.

17. (previously presented) The receiver of claim 16, wherein:

the waveform generator produces a plurality of time-varying signals each having a different frequency during a period and each changing frequency from one period to a subsequent period in the predetermined sequence of frequencies; and

the coherent demodulator produces the channel estimate from the received signal and each of the time-varying signals.

18. (previously presented) The receiver of claim 15, wherein

the predetermined sequence spans frequencies within the channel to directly provide a frequency domain channel estimate.

19. (previously presented) The receiver of claim 15, wherein

the predetermined sequence is coordinated with a field sync within the received signal.

20. (previously presented) The receiver of claim 15, wherein

the time varying frequency cycles through each of the frequencies within the predetermined sequence at a rate sufficient to permit multiple channel estimates for a single field of the received signal.

21. (previously presented) The receiver of claim 15, including:

a channel estimate post-processor that is configured to:

smooth the channel estimate,

track time varying fades within the channel estimate, and

produce Doppler estimates for the channel estimate.

22. (previously presented) A method of wireless communication, comprising:

adding one or more supplemental signals on a plurality of frequencies to a data signal within a monocarrier channel; and

computing a frequency domain channel estimate for use in equalizing the channel during demodulation of the data signal based on the one or more supplemental signals.

23. (previously presented) The method of claim 22, wherein:

the one or more supplemental signals each use a different frequency that changes during each of a plurality of periods, and the time-varying frequency for each of the supplemental signals changes from one period to a subsequent period in a predetermined sequence of frequencies within the channel.

24. (previously presented) The method of claim 23, including

periodically changing a frequency for each supplemental signal in a predetermined sequence spanning frequencies within the channel, to directly provide a frequency domain channel estimate.

25. (previously presented) The method of claim 23, including

coordinating the predetermined sequence with a field sync within the data signal.

26. (previously presented) The method of claim 23, including

sweeping each supplemental signal through each of the frequencies within the predetermined sequence at a rate sufficient to permit multiple channel estimates for a single field of the data signal.

27. (previously presented) The method of claim 22, including

providing each of the supplemental signals with a power selected to avoid interference with demodulation of the data signal without reference to the one or more supplemental signals.

28. (previously presented) The method of claim 22, including:

periodically changing a frequency for each supplemental signal in a predetermined sequence of frequencies within the channel coordinated with a field sync within the data signal;
and

providing each of the supplemental signals with a power selected to avoid interference with demodulation of the data signal without reference to the one or more supplemental signals.

29. (currently amended) A method for improved wireless communications, comprising:

producing a data signal;

producing a time-varying signal that changes frequency during each of a plurality of periods, wherein

Serial No. 10/040,173

the frequency changes from one period to a subsequent period in a predetermined sequence of frequencies within a channel to be employed in transmitting the data, the time-varying signal being provided with a power selected to avoid interference with demodulation of the data signal without reference to the time-varying signal; and

producing a transmission signal from a sum of the data signal and the time-varying signal.

30. (Previously presented) The method of claim 29, wherein

the predetermined sequence spans the channel to directly provide a frequency domain channel estimate.

31. (canceled)

32. (canceled)

33. (previously presented) The method of claim 29, wherein

the time varying signal cycles through each of the frequencies within the predetermined sequence at a rate sufficient to permit multiple channel estimates for a single field of the data signal.

34. (currently amended) The method of claim 29, wherein:

the predetermined sequence is coordinated with a field sync within the data signal, ~~and the time-varying signal is transmitted with a power selected to avoid interference with demodulation of the data signal without reference to the time-varying signal.~~

35. (previously presented) The method of claim 29, wherein

the time-varying signal is one of a plurality of time-varying signals each having a different frequency during a period and each changing frequency from one period to a subsequent period in the predetermined sequence of frequencies.

36. (previously presented) A method for improved wireless communications, comprising:

receiving a received signal that includes a data signal and a concurrently transmitted equalization signal;

generating a time-varying signal corresponding to the concurrently transmitted equalization signal;

producing a channel estimate from the received signal and the time-varying signal, wherein

the time-varying signal changes frequency during each of a plurality of periods, wherein

the frequency changes from one period to a subsequent period in a predetermined sequence of frequencies within a channel on which the received signal is received; and

demodulating the data signal based on a channel equalization of the received signal utilizing the channel estimate.

37. (previously presented) The method of claim 36, including

producing the time varying-signal with a period duration and the predetermined sequence matching a corresponding period duration and predetermined sequence employed in generating the received signal.

38. (previously presented) The method of claim 37, including

producing a plurality of time-varying signals each having a different frequency during a period and each changing frequency from one period to a subsequent period in the predetermined sequence of frequencies,

wherein

the channel estimate is produced from the received signal and each of the time-varying signals.

39. (previously presented) The method of claim 36, wherein

the predetermined sequence spans frequencies within the channel to directly provide a frequency domain channel estimate.

40. (previously presented) The method of claim 36, wherein

the predetermined sequence is coordinated with a field sync within the received signal.

41. (previously presented) The method of claim 36, wherein

the time varying frequency cycles through all frequencies within the predetermined sequence at a rate sufficient to permit multiple channel estimates for a single field of the received signal.

42. (previously presented) The method of claim 36, including:

smoothing the channel estimate,

tracking time varying fades within the channel estimate, and

producing Doppler estimates for the channel estimate.

43. (currently amended) A method for using a wireless communication signal, comprising:

providing a data signal; and

summing at least one supplemental signal ~~summed~~ with the data signal, the at least one supplemental signal having a frequency that changes during each of a plurality of periods in a predetermined sequence of frequencies for a channel in which the wireless communication signal is transmitted, the at least one supplemental signal having a power sufficiently less than a power for the data signal to permit demodulation of the data signal without reference to the at least one supplemental signal.

44. (currently amended) The ~~wireless communications signal~~ method of claim 43 wherein the predetermined sequence of frequencies spans the channel.

45. (canceled)

46. (currently amended) The ~~wireless communications signal~~ method of claim 43, wherein the at least one supplemental signal sweeps the predetermined sequence at a rate sufficient to permit multiple channel estimates based on the at least one supplemental signal within a single field of the data signal.

47. (canceled)

48. (currently amended) The ~~wireless communications signal~~ method of claim 43, wherein

the at least one supplemental signal includes:

a plurality of supplemental signals each having a different frequency during a given period and each changing frequencies in the predetermined sequence from one period to a subsequent period.

49. (currently amended) The ~~wireless communications signal~~ method of claim 43, wherein

the wireless communications signal is a result of modulating the sum of the data signal and the at least one supplemental signal.

50. (new) A transmitter for improved wireless communications comprising:

a symbol source producing a data signal;

a waveform generator producing a time-varying signal that changes frequency during each of a plurality of periods, wherein the frequency changes from one period to a subsequent period in a predetermined sequence of frequencies within a channel to be employed in transmitting the data, the predetermined sequence being coordinated with a field sync within the data signal; and

a modulator producing a transmission signal from a sum of the data signal and the time-varying signal.

51. (new) A method for improved wireless communications, comprising:

producing a data signal;

producing a time-varying signal that changes frequency during each of a plurality of periods, wherein

the frequency changes from one period to a subsequent period in a predetermined sequence of frequencies within a channel to be employed in transmitting the data, the predetermined sequence being coordinated with a field sync within the data signal; and

producing a transmission signal from a sum of the data signal and the time-varying signal.

52. (new) A method for using a wireless communication signal, comprising:

providing a data signal; and

summing at least one supplemental signal ~~summed~~ with the data signal, the at least one supplemental signal having a frequency that changes during each of a plurality of periods in a predetermined sequence of frequencies for a channel in which the wireless communication signal is transmitted, the predetermined sequence being coordinated with a field sync within the data signal.